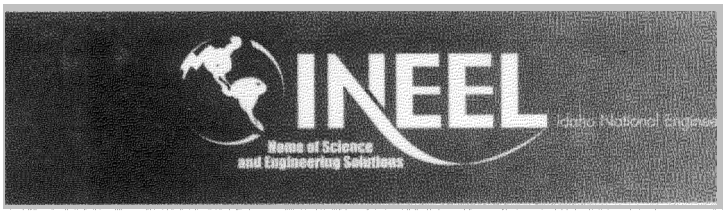
DOE/ID-11066
Revision 0
Project No. 23339
June 2003

U.S. Department of Energy
Idaho Operations Office

Monitored Natural Attenuation Operations, Monitoring, and Maintenance Plan for Test Area North, Operable Unit 1-07B



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June 2003

Prepared for the
U.S. Department of Energy
Idaho Operations Office

ABSTRACT

The final remedy for Operable Unit 1-07B combines in situ bioremediation for hot spot restoration, pump-and-treat for medial zone restoration, and monitored natural attenuation for distal zone restoration, providing a comprehensive approach to contaminant plume remediation. The Operable Unit 1-07B remedy will prevent current and future exposure of workers, the public, and the environment to contaminated groundwater at the Technical Support Facility injection well site. This Operations, Monitoring, and Maintenance Plan is specific to the monitored-natural attenuation component of the remedy. This document describes work activities that will be necessary to ensure that continued monitoring and evaluation of monitored natural attenuation's effectiveness is performed as required. It also serves as a field sampling plan, presents strategies for data evaluation, and describes activities required for long-term maintenance of the monitoring network.

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ACRONYMS

BLM	U.S. Bureau of Land Management
CFR	Code of Federal Regulations
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
COC	contaminant of concern
DCE	dichloroethene
DOE	U.S. Department of Energy
DOE-ID	U.S. Department of Energy Idaho Operations Office
DQO	data quality objective
EPA	U.S. Environmental Protection Agency
FLUTe®	Flexible Liner Underground Technology
HDPE	high-density polyethylene
ID	identification
INEEL	Idaho National Engineering and Environmental Laboratory
LST	list
MCL	maximum contaminant level
MCP	management control procedure
MDA	minimum detection activity
MDL	method detection limit
MNA	monitored natural attenuation
NPTF	New Pump and Treat Facility
OU	operable unit
PCE	tetrachloroethene
PM/CM	performance monitoring/compliance monitoring
PVC	polyvinyl chloride
PVDF	polyvinylidene fluoride

QA	quality assurance
QC	quality control
RAO	remedial action objective
RPD	relative percent difference
SAP	Sampling and Analysis Plan
TAN	Test Area North
TCE	trichloroethene
TOS	Task Order Statement of Work
TPR	technical procedure
TSF	Technical Support Facility
USC	United States Code
USGS	United States Geological Survey
VC	vinyl chloride
VOC	volatile organic compound
WAG	waste area group

Monitored Natural Attenuation Operations, Monitoring, and Maintenance Plan for Test Area North, Operable Unit 1-07B

1. INTRODUCTION

This Operations, Monitoring, and Maintenance Plan was prepared in support of the *Monitored Natural Attenuation Remedial Action Work Plan for Test Area North, Final Groundwater Remediation, Operable Unit 1-07B* (DOE-ID 2003) and the *Remedial Design/Remedial Action Scope of Work Test Area North Final Groundwater Remediation Operable Unit 1-07B* (DOE-ID 2001a). The U.S. Department of Energy Idaho Operations Office (DOE-ID) has prepared this document in accordance with the *Federal Facility Agreement and Consent Order for the Idaho National Engineering Laboratory* (DOE-ID 1991). This plan addresses the implementation of monitored natural attenuation (MNA) at Test Area North (TAN), which is the remedy for remediation of the distal portion of the contaminated groundwater plume associated with the Technical Support Facility (TSF) injection well (TSF-05). The groundwater plume that emanates from the TSF injection well has been designated as Operable Unit (OU) 1-07B. This Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) (42 USC § 9601 et seq.) remedial action will proceed in accordance with the signed *Record of Decision Amendment—Technical Support Facility Injection Well (TSF-05) and Surrounding Groundwater Contamination (TSF-23) and Miscellaneous No Action Sites, Final Remedial Action* (DOE-ID 2001b).

This plan describes work activities that will be necessary to ensure that continued monitoring and evaluation of MNA's effectiveness are performed as required. The project objectives are described in Section 2. The implementation strategy for the MNA sampling program is presented in Section 3. Section 4 describes the existing infrastructure and Section 5 details the groundwater monitoring plan. The subsequent sections describe required activities for long-term maintenance of the monitoring network, institutional controls, safety and health measures, and project reporting.

2. MONITORED NATURAL ATTENUATION OBJECTIVES

This plan describes activities that are necessary to implement the requirements for the MNA component of the remedy. The project objectives developed in the Remedial Action Work Plan (DOE-ID 2003)—including remedial action objectives (RAOs), performance monitoring/compliance monitoring (PM/CM) objectives, and data quality objectives (DQOs)—are repeated here for convenience. These objectives provided the basis for developing the groundwater-monitoring strategy outlined in the Remedial Action Work Plan (DOE-ID 2003).

2.1 Remedial Action Objectives

The RAOs, as described in the Remedial Action Work Plan (DOE-ID 2003), include the following:

- Restore the contaminated aquifer groundwater by 2095 (100 years from the signature of the Record of Decision [DOE-ID 1995]) by reducing all contaminants of concern (COCs) to below maximum contaminant levels (MCLs) and a 1×10^{-4} total cumulative carcinogenic risk-based level for future residential groundwater use and for noncarcinogens, until the cumulative hazard index is less than one.

- For aboveground treatment processes in which treated effluent will be re-injected into the aquifer, reduce the concentrations of volatile organic compounds (VOCs) to below MCLs and a 1×10^{-5} total risk-based level.

- Implement institutional controls to protect current and future users from health risks associated with (1) ingestion or inhalation of, or dermal contact with, contaminants in concentrations greater than the MCLs; (2) contaminants with greater than a 1×10^{-4} cumulative carcinogenic risk-based concentration; or (3) a cumulative hazard index of greater than one, whichever is more restrictive. The institutional controls shall be maintained until all COC concentrations are below MCLs and until the cumulative carcinogenic risk-based level is less than 1×10^{-4} and for noncarcinogens, until the cumulative hazard index is less than one. Institutional controls shall include access restrictions and warning signs.

2.2 Performance and Compliance Monitoring Objectives

The general PM/CM objectives for MNA consist of demonstrating meaningful progress toward restoring the distal zone of the contaminated aquifer groundwater to achieve the aforementioned RAOs. The PM/CM objectives will be met through the collection of monitoring data that demonstrate plume restoration by 2095. These objectives are divided into two specific compliance objectives and two performance objectives.

Compliance objectives consist of the following:

- Conduct groundwater monitoring at all MNA performance-monitoring wells at a frequency and duration sufficient to demonstrate that the remedy is operational, functional, and effective

- Demonstrate at the end of the remedial action period that RAOs for groundwater have been attained.

Performance objectives consist of the following:

- Monitor whether the natural attenuation process continues to trend toward the RAOs for the distal zone of the plume
- Monitor plume expansion.

Following U.S. Environmental Protection Agency (EPA) guidance (EPA 2000), specific DQOs were developed in the Remedial Action Work Plan (DOE-ID 2003) to define data requirements to support these project objectives and ultimately the RAOs. Specific study questions and project decisions were defined, and the type and quality of groundwater monitoring data needed to support those decisions were identified. As a result, the requirements for groundwater monitoring were clearly defined in the Remedial Action Work Plan (DOE-ID 2003). The following sections implement the requirements of the Remedial Action Work Plan.

3. MONITORED NATURAL ATTENUATION IMPLEMENTATION STRATEGY

As established in the Remedial Action Work Plan (DOE-ID 2003), a two-phased implementation strategy was developed for MNA to ensure that key performance parameters can be monitored and evaluated. The operational phases are described in Section 3.1. In addition, operations, monitoring, and maintenance work activities are supported by a comprehensive set of documents and procedures, as described in Section 3.2.

3.1 Operational Phases

The strategy to implement MNA at OU 1-07B is to divide the groundwater-monitoring program into three distinct monitoring zones and two operational phases. The area of each monitoring zone is based on the expected time that will be required to identify concentration trends for wells within that zone and to confirm that trichloroethene (TCE) is being transported and degraded as expected. Zone 1 is the upgradient portion of the plume, where peak breakthrough is thought to have already occurred based on previous modeling studies. In Zone 1, confirmatory data are expected to be obtained within approximately 10 years. Zone 2 is the downgradient portion of the plume where confirmatory concentration trends might require in excess of 20 years to collect. Zone 3 is the area outside the downgradient extent of the plume where groundwater data will be used to monitor plume expansion.

Two operational phases also are defined to show measurable progress toward attainment of the performance and compliance objectives. The first operational phase, Performance Operations, allows for a period of annual data collection and analysis to confirm the remedy's effectiveness. The second phase, Long-Term Operations, consists of confirmatory monitoring to track progress toward achieving RAOs for the duration of the 100-year operational period. Descriptions of each phase, as presented in the Remedial Action Work Plan (DOE-ID 2003), are provided here for convenience.

3.1.1 Performance Operations Phase

The performance operations phase will consist of a period of annual sampling and analysis activities to confirm that TCE is being transported and degraded as expected. The duration of this phase varies, based on the results of the data collected. For Zone 1, it is expected that sufficient data can be collected within 10 years to confirm or deny that peak breakthrough of TCE has occurred at a time sufficient to meet RAOs. A remedial action report is scheduled for Agency review and approval in 2013. This report will include analyses of the monitoring data and evidence of naturally occurring biodegrading activity in the groundwater plume. Based on the data presented in the remedial action report, the Agencies will determine whether to (1) extend the performance period, (2) move Zone 1 into long-term operations and continue the performance period for Zone 2, or (3) end the performance period for Zones 1 and 2 and move into the long-term operations phase. Depending on which option is supported by the data, a second remedial action report could be produced later to document performance in Zone 2.

Data collected during the first 2 years of performance operations will be used to calibrate and, if necessary, revise the numerical fate and transport model. The calibrated numerical model will be used during performance operations to predict long-term concentration trends and determine whether RAOs can be achieved by 2095.

3.1.2 Long-Term Operations Phase

Long-term operations will begin for each zone once the determination is made that MNA is operational and functional in that zone. This phase will consist of groundwater monitoring for the duration of the remedial action period to track the remedy's progress toward achieving the RAOs. Once

long-term operations begin, MNA will be considered functional and operational and—as with any other Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) remedy—will be reviewed at least every 5 years to verify performance. The Agencies will determine the monitoring frequency for long-term operations, based on the remedial action report.

Monitoring will continue in Zone 3 throughout both operational phases. In the Record of Decision Amendment (DOE-ID 2001b), it was determined that acceptable plume expansion is limited to 30% based on the understanding of plume length in the *Explanation of Significant Differences from the Record of Decision for the Technical Support Facility Injection Well (TSF-05) and Surrounding Groundwater Contamination (TSF-23) and Miscellaneous No Action Sites, Final Remedial Action* (INEEL 1997). The 30% expansion will be determined based on the extent to which the length of the plume along the major axis increases.

3.2 Project Documents and Procedures

This section identifies the procedures and documents that will be required to operate the MNA remedial component. All MNA operations will be performed in accordance with both CERCLA and Idaho National Engineering and Environmental Laboratory (INEEL) work-control requirements. The procedures for MNA activities were developed specifically in accordance with INEEL Management Control Procedure (MCP) -3562, "Hazard Identification, Analysis, and Control of Operational Activities," and List (LST) -235, "Operable Unit 1-07B Conduct of Operations Conformance Matrix Environmental Restoration Directorate (DOE Order 5480.19)."

To support operations startup, the required documents and technical procedures (TPRs) will be assembled into an MNA implementation manual. Figure 3-1 illustrates the MNA document hierarchy. Table 3-1 identifies the governing project documents. Table 3-2 lists the supporting TPRs for this component of the remedy.

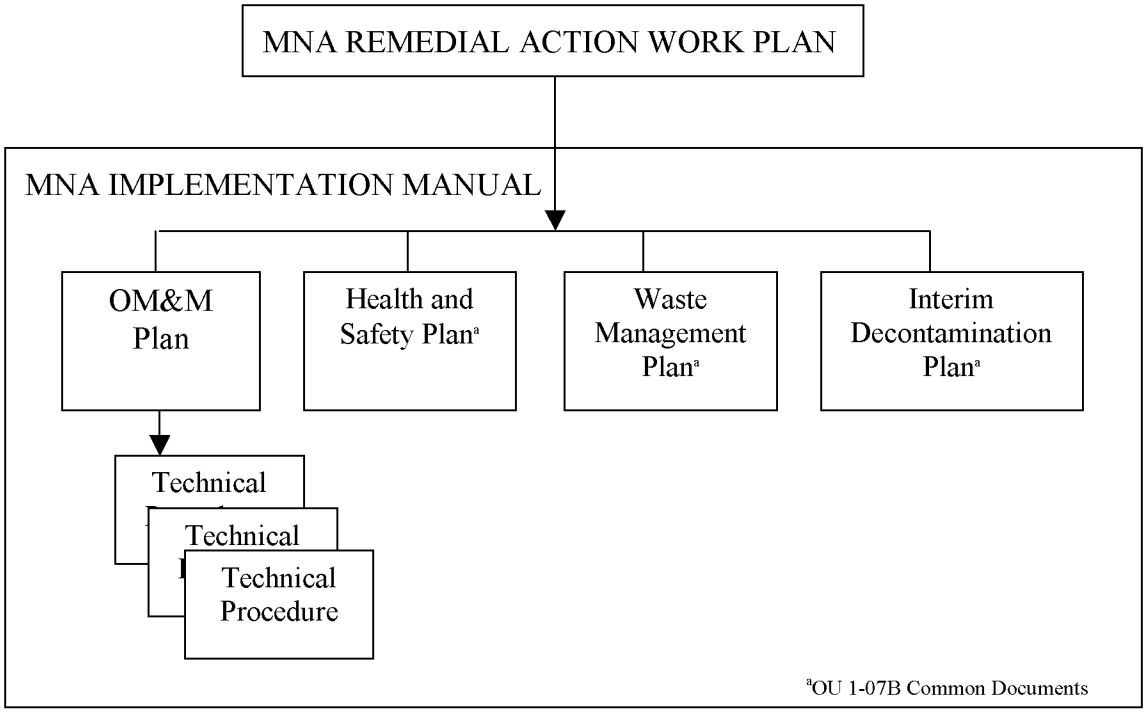

Figure 3-1. Document hierarchy for the monitored-natural attenuation component of the Operable Unit 1-07B remedy.

Table 3-1. Governing project documents.

MNA Operations	Project Documents
Remedial action requirements	*Monitored Natural Attenuation Remedial Action Work Plan for Test Area North Final Groundwater Remediation, Operable Unit 1-07B* (DOE-ID 2003)
Operation requirements	*Monitored Natural Attenuation Operations, Monitoring, and Maintenance Plan for Test Area North, Operable Unit 1-07B*
Health and safety	*Test Area North Operable Unit 1-07B Final Groundwater Remedial Action Health and Safety Plan* (INEEL 2002a)[a]
Quality assurance requirements	*Quality Assurance Project Plan for Waste Area Groups 1, 2, 3, 4, 5, 6, 7, 10, and Inactive Sites* (DOE-ID 2002)[a]
Waste management	*Waste Management Plan for Test Area North Final Groundwater Remediation Operable Unit 1-07B* (INEEL 2002b)[a]
Decontamination	*Interim Decontamination Plan for Operable Unit 1-07B* (INEEL 2002c)[a]

a. Operable Unit 1-07B common documents.
DOE-ID = U.S. Department of Energy Idaho Operations Office
INEEL = Idaho National Engineering and Environmental Laboratory
MNA = monitored natural attenuation

Table 3-2. Operational and technical procedures for monitored natural attenuation.

MNA Sampling Activities	Procedures[a]
Sampling process	TPR-165, "Low-Flow Groundwater Sampling Procedure," and TPR-6371, "FLUTe® Liner Water Sampling"
Monitoring purge parameters	TPR-6248, "OU 1-07B Hydrolab Operation and Maintenance (Draft)," and TPR-6247, "Troll 9000 Water Quality Probe (Draft)"
Use of nondedicated sampling equipment	TPR-4907, "Installation and Removal of Equipment in TAN Wells"
Measuring water levels	TPR-4907, "Installation and Removal of Equipment in TAN Wells"
Sample packaging, transportation, and shipping	MCP-1193, "Handling and Shipping Samples for ER and D&D&D Projects"[b]
Sample chain of custody	MCP-1192, "Chain of Custody and Sample Labeling for ER and D&D&D Projects"[b]
Training requirements	TPR-167, "OU 1-07B Operating Procedures Training Requirements"
Management of data	OU 1-07B Data Management Plan[c]
Well maintenance	OU 1-07B Well Maintenance Plan[c]

a. Procedures shall be revised/updated as necessary; the current, equivalent procedure shall be used. These documents are common to OU 1-07B, unless otherwise noted.
b. These documents are common to INEEL Environmental Restoration.
c. To be prepared, see Section 10.
INEEL = Idaho National Engineering and Environmental Laboratory
MCP = management control procedure
OU = operable unit
TPR = technical procedure

4. WELL INFRASTRUCTURE

The MNA component of the OU 1-07B remedy has an extensive monitoring network in place. Many of these wells were constructed in support of site characterization activities or are in use by other components of the remedy. Specific sets of wells were identified in the Remedial Action Work Plan (DOE-ID 2003) to support the goals and objectives of MNA groundwater monitoring. Figure 4-1 depicts the wells that have been identified for the MNA component of the remedy. After completion of in situ bioremediation and New Pump and Treat Facility (NPTF) remedy components, the MNA monitoring program may be expanded to include additional wells, as warranted by groundwater conditions at that time. The monitoring network is further described in Section 5.

A summary of well-construction information for the OU 1-07B MNA monitoring wells is provided in Appendix A. Detailed information is maintained in the OU 1-07B project files and the INEEL Hydrogeologic Data Repository. The table in Appendix A includes well names, material type, depth, screened or open interval, top of casing elevation, pump type, discharge hose or pipe dimension, sampling depth, and the estimated purge volume for each well. As indicated in Appendix A, a number of MNA wells are sampled at multiple depths, either by use of Flexible Liner Underground Technology (FLUTe®) liners or multiple submersible pumps, to provide vertically discrete data.

Currently, the TAN-57, TAN-58, and ANP-8 monitoring wells do not have dedicated sampling equipment installed. Because these wells will be sampled frequently under the MNA Program, they will be improved with the installation of submersible pumps. The necessary upgrades will be completed during the performance operations period.

For those wells that are not screened at specific intervals, the sampling depths are subject to change. The depths indicated in Appendix A currently must be used for sampling, but may be revised as directed by the OU 1-07B project manager.

Should contaminant concentrations at downgradient locations indicate expansion of the plume (as discussed in the Remedial Action Work Plan [DOE-ID 2003]), an additional well may be installed at a further downgradient location. The decision to construct a new well, and its exact location, will be presented in the remedial action report for Zone 1.

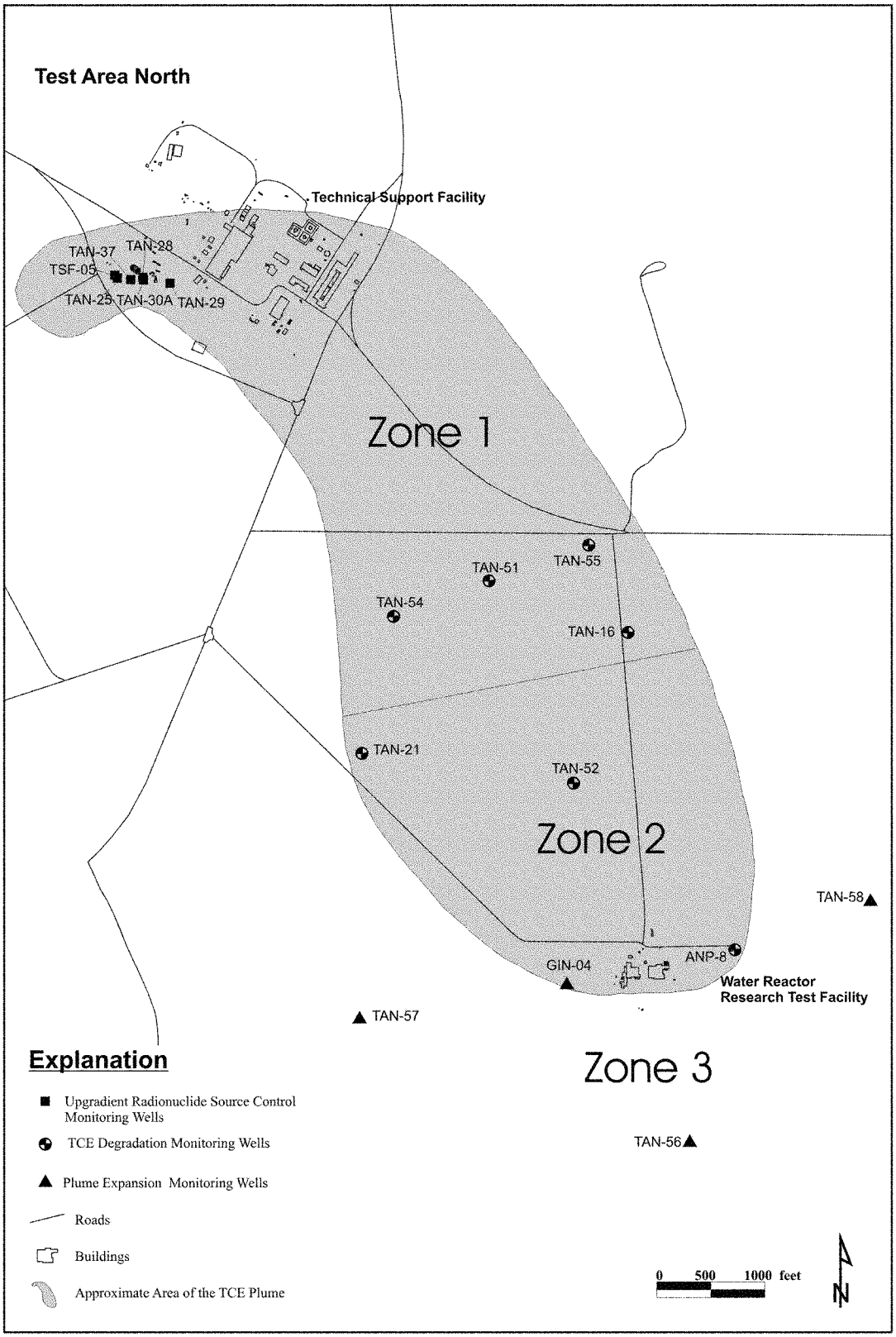

Figure 4-1. Monitoring wells identified for the monitored-natural-attenuation component of the Operable Unit 1-07B remedy.

5. GROUNDWATER-MONITORING PLAN

This section describes the groundwater-monitoring plan for MNA during the performance operations phase. The groundwater-monitoring plan for long-term operations will be established in a subsequent revision of this document, based on the recommendations made in the remedial action report at the end of performance operations. In addition, after completion of in situ bioremediation and NPTF operations, the MNA monitoring network may be expanded to include additional wells. This section describes the data collection program, methods for data management and reporting, and the data evaluation and decision-making process.

5.1 Data Collection Program

Specific groundwater-monitoring activities must be planned and carried out over the two phases of the MNA component of the remedy to implement the requirements of the Remedial Action Work Plan (DOE-ID 2003). The Remedial Action Work Plan requires that certain data be collected to support PM/CM activities. This data collection program implements the requirements of the Remedial Action Work Plan, specifying monitoring locations, analytes, sampling frequencies, and data-quality levels. This section serves as the sampling and analysis plan for MNA and references TPRs that are required to guide specific work activities.

5.1.1 Sampling Locations and Frequencies

As required in the Remedial Action Work Plan (DOE-ID 2003), groundwater samples will be collected from a representative set of wells in each of the three monitoring zones. Zone 1 performance-monitoring wells include TAN-16, TAN-51, TAN-54, and TAN-55 for VOC contaminants and TAN-25, TAN-28, TAN-29, TAN-30A, TAN-37, and TSF-05 for radionuclide contaminants. Monitoring of VOC contaminants in Zone 1 will be performed annually to determine whether peak TCE concentration breakthrough has occurred at these wells, as predicted by numerical modeling. Monitoring of radionuclide contaminants in Zone 1 will be performed annually to verify that radionuclide concentrations combined with radioactive decay and observed rates of attenuation will be below MCLs before 2095.

Zone 2 performance-monitoring wells include TAN-21, TAN-52, and ANP-8. Monitoring of VOC contaminants in Zone 2 will be performed annually to identify whether wells in this area exhibit peak concentration breakthroughs, as predicted by numerical modeling. Tritium also will be monitored in Zone 2.

Zone 3 monitoring wells include TAN-56, TAN-57, TAN-58, and GIN-4. Monitoring in Zone 3 will be performed to verify that the plume does not expand axially more than 30% beyond the downgradient extent of the 5-ug/L isopleth that was estimated in the Explanation of Significant Differences (INEEL 1997). Samples will be collected from the selected Zone 3 wells once every 3 years and will be analyzed for VOC COCs. Note that the Zone 3 monitoring plan may be revised, including the installation of a new downgradient monitoring well, should data warrant.

Sampling activities include collection and analysis of vertically discrete samples from wells with FLUTe® liners (TAN-51, TAN-54, TAN-55, TAN-52, and TAN-56). It is anticipated that similar monitoring activities will be continued during long-term operations, probably at a reduced frequency as warranted by the data. The monitoring plan for long-term operations, including sample locations and frequencies, will be presented in a subsequent revision of this plan, based on the data results and recommendations made in the remedial action report for Zone 1 at the end of performance operations.

Specific sampling requirements to verify attainment of RAOs at the end of long-term operations likewise will be developed in the remedial action report. A specific set of attainment verification wells representative of the contaminant plume will be identified, and the sampling frequency and period will be designed to support decision-making at the level of confidence required by the Agencies. (The specific number of samples required will be influenced by the natural variability observed in the data during performance operations.)

Table 5-1 summarizes the zone, sampling frequency, monitoring location, and analyte list for performance operations. Note that vinyl chloride (VC), although it is not a COC, is included in the analyte list, as it may be useful in evaluating MNA's performance and typically is reported with the other VOC analytes.

Table 5-1. Summary of the monitoring requirements for performance operations.

Zone	Frequency	Location	Parameters
1	Annual	TAN-16, TAN-51[a], TAN-54[a], and TAN-55[a]	TCE, PCE, cis- and trans-DCE, VC, and H-3
		TAN-25, TAN-28, TAN-29, TAN-30A, TAN-37[a], and TSF-05[a]	Gross alpha, Sr-90, Cs-137, and H-3
2	Annual	TAN-52[a], TAN-21, and ANP-8	TCE, PCE, cis- and trans-DCE, VC, and H-3
3	Every 3 years	GIN-4, TAN-56[a], TAN-57, and TAN-58	TCE, PCE, cis- and trans-DCE, VC, and H-3

a. Well is sampled at multiple depths. See Appendix A for details.
DCE = dichloroethene
PCE = tetrachloroethene
TAN = Test Area North
TCE = trichloroethene
TSF = Test Area North
VC = vinyl chloride

Groundwater levels will be measured periodically, as determined by the OU 1-07B project manager, to maintain the regional gradient maps. To accomplish this task, water levels from numerous regional wells will be measured with an electronic measuring tape, as described in TPR-4907, "Installation and Removal of Equipment in TAN Wells."

5.1.2 Analytical Methods and Reporting

The OU 1-07B project manager will contract off-Site laboratories to perform the required analyses. Specific requirements for the laboratory analyses are defined in the Task Order Statement of Work (TOS) prepared for each analytical service contract.

Table 5-2 identifies the analytical method, method detection limit (MDL), and minimum detection activity (MDA) for specified VOCs and radionuclides. For purposes of performance monitoring, EPA Method SW-846 8260B, "Volatile Organic Compounds by Gas Chromatography/Mass Spectrometry (GC/MS)," will be used for VOC analysis. An MDL no higher than 2 µg/L will be required for MNA performance monitoring for all VOC contaminants of interest. For purposes of verifying attainment of RAOs, specific analytical methods and required MDLs will be established in subsequent revisions of this plan after completion of the performance operations phase.

Methods for radiochemical analysis also are presented in Table 5-2. Because radionuclide concentrations in many areas of the contaminated groundwater plume are relatively low, methods with low MDAs are recommended at least through the performance operations phase. Depending on the radionuclide concentrations observed during the performance operations phase, screening methods might be recommended in the remedial action report for radiological performance monitoring during long-term operations.

Table 5-2. Remedial action analytical-method summary for monitored natural attenuation.

Analyte	Analytical Method	Method Detection Limit/Minimum Detectable Activity	Monitoring Purpose
VOCs			
TCE	SW-846 8260B	2 µg/L	Performance
PCE	SW-846 8260B	2 µg/L	Performance
cis-DCE	SW-846 8260B	2 µg/L	Performance
trans-DCE	SW-846 8260B	2 µg/L	Performance
VC	SW-846 8260B	2 µg/L	Performance
Radionuclides			
H-3	Liquid scintillation counting[a,b]	400 pCi/L	Performance
Sr-90	Gas flow proportional[a,b]	1 pCi/L	Performance
Cs-137	Gamma spectrometry[a,b]	30 pCi/L	Performance
U-234	Gross alpha[a]	NA	Performance

a. Specific analytical requirements and performance-based standards for radiological analyses will be established in the laboratory TOS.
b. After the performance operations phase, methods for the radiological analyses may be re-evaluated. Screening methods may be recommended in the remedial action report for continued analyses during long-term operations.
DCE = dichloroethene
PCE = tetrachloroethene
TCE = trichloroethene
TOS = Task Order Statement of Work
VC = vinyl chloride
VOC = volatile organic compound

The OU 1-07B project manager establishes the laboratory reporting requirements in the TOS for performing laboratory work. For MNA groundwater monitoring, it is important that analytical laboratories be required to report actual values for detections below practical quantitation limit and MDL/MDA limits, with the appropriate data qualifiers. The laboratories will not substitute analytical values with entries such as the MDL, <MDL, and nondetect (EPA 1992). Laboratory quality assurance results will be summarized and reported in the MNA annual reports.

5.1.3 Sampling Procedures, Control, and Records

Samples will be collected according to the strategy summarized in Table 5-1. The OU 1-07B project manager will prepare specific Sampling and Analysis Plan (SAP) tables before each sampling event. Appendix B presents examples of SAP tables for performance operations.

In an effort to minimize SAP discrepancies, SAP tables will be prepared immediately before each sampling event, and the completed SAP tables will be included in the MNA annual report for the reporting period. The field team leader is responsible for SAP table accuracy. The field team leader and field team members will collect the required samples. The general roles of each are defined in the *Test Area North Operable Unit 1-07B Final Groundwater Remedial Action Health and Safety Plan* (INEEL 2002a), while the specific responsibilities for each position are specified in the procedures referenced in this section.

5.1.3.1 Low-Flow Well Purging and Sample Collection. Sampling of open borehole or screened wells with dedicated sampling equipment will be conducted using the equipment and techniques specified in TPR-165, "Low-Flow Groundwater Sampling Procedure." This procedure addresses training, equipment, instrument calibrations, purging, sampling, purge-water management, decontamination and cleaning of equipment, and record keeping in support of this monitoring plan. The OU 1-07B project manager will update the procedure for low-flow sampling as required for the duration of the monitoring program.

As mentioned in Section 4, the TAN-57, TAN-58, and ANP-8 monitoring wells currently do not have dedicated sampling equipment installed. As these wells will be sampled frequently under the MNA Program, they will be upgraded with the installation of dedicated sampling equipment.

In the event that dedicated sampling equipment is unavailable to support a scheduled sampling round (e.g., if dedicated equipment cannot be installed in time to support the 2003 sampling), portable, submersible pumps will be used to collect samples. Before sampling, all nondedicated, reusable sampling equipment that contacts the sample water will be cleaned in accordance with the procedures in the *Interim Decontamination Plan for Operable Unit 1-07B* (INEEL 2002c). A variable-speed submersible pump will be installed with the inlet at the correct sample depth (see Appendix A) 24 hours before commencement of purging/sampling. Purging and collection of samples will be performed as described in TPR-165 and according to the manufacturer's specifications. All equipment will be installed and removed according to TPR-4907, "Installation and Removal of Equipment in TAN Wells."

Multiparameter monitoring probes may be used during sampling, as directed by the OU 1-07B project manager, to record purge parameters during sampling. The multiparameter monitoring probes will be deployed, operated, and maintained as specified in TPR-6247, "Troll 9000 Water Quality Probe (Draft)";[a] TPR-6248, "OU 1-07B Hydrolab Operation and Maintenance";[b] or equivalent procedure.

5.1.3.2 FLUTe® Liner Purging and Sample Collection. As discussed previously, five MNA wells (TAN-51, TAN-52, TAN-54, TAN-55, and TAN-56) have been fitted with FLUTe® liners to facilitate sampling at multiple depths. Appendix A indicates the sample port depths for each FLUTe® well. Sampling of wells constructed with FLUTe® liners will be conducted in accordance with the requirements of TPR-6371, "FLUTe® Liner Water Sampling." This procedure addresses training, equipment, purging, sampling, purge-water management, decontamination and cleaning of equipment, and record keeping in support of this monitoring plan and will be updated as required for the duration of monitoring activities.

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a. TPR-6247, 2003, "Troll 9000 Water Quality Probe (Draft)," Idaho National Engineering and Environmental Laboratory, June 2003.

b. TPR-6248, 2003, "OU 1-07B Hydrolab Operation and Maintenance (Draft)," Idaho National Engineering and Environmental Laboratory, June 2003.

5.1.3.3 Sample Preparation and Preservation. Table 5-3 identifies the container size and type, preservative, and holding time for each analyte listed. Sample containers will be precleaned using the appropriate cleaning protocol for the analytical method. The VOC samples require zero headspace, so the sample bottles will be prepared with the appropriate preservative before sample collection. For Cs-137, Sr-90, and U-234 analyses, the sample will be preserved following collection and will be checked to ensure that the pH is less than two and meets shipping and transportation requirements. For samples that require preservation at or below 4°C, the collected samples will be cooled immediately after collection. The samples will be packed in coolers with ice and maintained at a temperature less than 4°C before shipment to ensure adequate preservation. Specific instructions for preparing sample containers and acidic preservative are provided in TPR-165, "Low-Flow Groundwater Sampling Procedure."

Table 5-3. Sample collection requirements for performance-monitoring samples.

Analytes	Container Size and Type[a]	Preservative	Holding Time	Comment
VOCs	Three glass 40-mL volatile-organic-analysis vials	4°C and pH<2 w/H_2SO_4	14 days	No headspace
Cs-137	1-2 or 2-1 L HDPE	HNO_3 to pH<2	6 months	—
Sr-90	1–500 mL HDPE	HNO_3 to pH<2	6 months	—
Tritium	1–125 mL HDPE	None	6 months	—
Gross alpha	1–500 mL HDPE	HNO_3 to pH<2	6 months	—

a. Final container specifications and required sample volumes will be identified in the TOS for individual laboratories.

HDPE = high-density polyethylene
TOS = Task Order Statement of Work
VOC = volatile organic compound

5.1.3.4 Sample Designation. A character-based sample identification system will be used to identify each sample at the time the final SAP tables are prepared. The identification code will be unique for each sample collected under MNA operations. The OU 1-07B project manager will assign the identification code at the time that SAP tables are prepared, in accordance with the *Data Management Plan Test Area North Operable Unit 1-07B* (Keller 1996). At a minimum, the sample identification will identify the OU, year, sample location, sample type, analysis type, and sequential sample number for a given location and year. The SAP tables will be used to record all pertinent information, including sample identification, location, depth, sample type, media, date, analysis types, collection type, and comments associated with each sample, in accordance with the Data Management Plan (Keller 1996).

5.1.3.5 Chain of Custody. Chain-of-custody procedures will be followed—in accordance with the requirements of MCP-1192, "Chain of Custody and Sample Labeling for ER and D&D&D Projects"—to maintain and document possession of samples shipped to a laboratory for analysis. The purpose of the chain of custody is to document the sample's identity and handling from the point of collection until laboratory analysis is complete. The chain-of-custody record is a multiple copy form that serves as a written record of the sample handling. When a sample changes custody, those personnel relinquishing or receiving the sample shall sign a chain-of-custody record. Each change of possession will be documented. The chain-of-custody procedures will begin immediately upon sample collection. The sample identification number, date, and time will be entered on the chain–of-custody form the day of sample collection. Sample bottles will be stored in a secured area accessible only to the field team members. Custody seals will be affixed to all individual sample containers to ensure that sample integrity is not compromised by tampering or unauthorized opening.

5.1.3.6 Sample Transportation and Shipping. Samples will be transported in accordance with the regulations issued by the U.S. Department of Transportation (49 CFR 171 through 178) and EPA sample handling, packaging, and shipping methods (40 CFR 261.4[d] and [e]). All samples will be packaged in accordance with the requirements of MCP-1193, "Handling and Shipping Samples for ER and D&D&D Projects," and the governing TOS.

5.1.3.7 Radiological Screening. Samples collected from the TAN-25 and TSF-05 wells must be surveyed for radiological activity before off-Site shipment. Additional requirements may be imposed by the applicable INEEL radiological work permit for work conducted at these wells.

5.1.4 Quality Assurance/Quality Control Requirements

Quality assurance (QA) and quality control (QC) activities will be implemented, as specified in this plan. For purposes of this plan, field QC measures include samples collected or prepared in the field during sampling and submitted to the laboratory to assess overall data quality of the sampling and analysis program (total measurement error). Field QC samples include field blanks, trip blanks, and field duplicates. The QC samples will be prepared in accordance with the instructions in TPR-165, "Low-Flow Groundwater Sampling Procedure." Frequencies for field QC samples are specified in Table 5-4.

Table 5-4. Field quality-control-sample frequencies.

Sample Type	Frequency	Comments
Field duplicate	1 per 20 samples[a]	All samples
Field blank	1 per 20 samples[a]	All samples
Trip blank	1 per sample cooler	For volatile-organic-compound samples

a. The minimum frequency is 1 per 20 samples or 1 per day (on days that primary samples are collected), whichever is less.

For purposes of this plan, laboratory QA measures are those checks that an analyst routinely runs to determine precision and accuracy of the analytical methods and equipment (method error). Laboratory QA measures typically include blanks, standards, duplicates, standard reference materials, and standard additions (matrix spikes). The QA measures will be identified in the analytical service contracts according to the *Quality Assurance Project Plan for Waste Area Groups 1, 2, 3, 4, 5, 6, 7, 10, and Inactive Sites*, (DOE-ID 2002).

5.1.5 Data Validation Requirements

All data collected for use in MNA PM/CM will be definitive data requiring Level B validation. During performance operations, Level B data-validation levels—as defined in the Quality Assurance Project Plan (DOE-ID 2002)—are required for all analyses to support the decisions regarding MNA. Data validation requirements for long-term monitoring will be re-examined in the remedial action report. (During long-term operations, less stringent validation requirements may be warranted for routine performance monitoring.) Level A validation will be required for all data used for verifying the attainment of RAOs. The OU 1-07B project manager may request that Level A validation be performed on a case-by-case basis, as necessary.

In general, definitive level data are generated using approved analytical methods, such as EPA SW-846 methods. Either analytical or total measurement error must be determined. Definitive data QA/QC elements include (DOE-ID 2002):

- Sample documentation (e.g., location, date, and time).
- Chain of custody.
- Sampling design approach.
- Initial and continuing calibration.
- Determination and documentation of detection limits.
- Analyte or property identification (ID).
- QC blanks (field and method).
- Matrix spike recoveries.
- Analytical error determination; one sample will be analyzed in replicate, and the mean and standard deviation will be determined and reported.
- Total measurement error determination; duplicate samples will be collected at one sampling location in each sampling round, analyzed, and the mean and standard deviation will be determined and reported.

Precision, accuracy, and completeness requirements also are established in the Quality Assurance Project Plan (DOE-ID 2002) for off-Site laboratories (see Table 5-5). The OU 1-07B project manager will establish the laboratory reporting requirements for QA data in the TOS for the performing laboratory. Laboratory QA results will be included in the MNA annual report.

Table 5-5. Laboratory quality-assurance requirements for definitive data, as defined by the Quality Assurance Project Plan.

QA Parameter	VOCs	Parameter Calculated
Precision		
Duplicates	TCE: ±14%	RPD
Accuracy		
Standards	71–120%	% Recovery
Matrix spikes	71–120%	% Recovery
Completeness		
Compliance monitoring	100%	% Complete

QA = quality assurance
RPD = relative percent difference
TCE = trichloroethene
VOC = volatile organic compound

5.1.6 Waste Management

The sampling activities described above will generate potentially contaminated wipes, sample bottles, personal protective equipment, and purge water. All waste generated as a result of MNA groundwater-monitoring activities will be managed in compliance with the requirements of the *Waste Management Plan for Test Area North Final Groundwater Remediation Operable Unit 1-07B* (INEEL 2002b). Debris material will be bagged, labeled, and transferred to the OU 1-07B waste storage unit, as described in the Waste Management Plan (INEEL 2002b). Purge water from wells within the TCE plume and any associated equipment decontamination water will be treated and re-injected through the NPTF during its operational lifetime to meet the RAO for aboveground treatment processes. Procedures for disposal of purge water after completion of the NPTF will be discussed in the remedial action report. Note that purge water from wells located outside the contaminated groundwater plume (TAN-56, TAN-57, and TAN-58) does not contain constituents that require management as hazardous waste and can be purged to the ground (INEEL 2002d).

5.2 Data Management and Reporting

The detailed steps of the data management process will be described in a data management plan for OU 1-07B. In general, data are obtained from the following sources: (1) the field team logbooks, (2) purge log sheets, (3) laboratory data packages and associated validation reports, and (4) SAP tables. Upon receipt of data from these sources, the OU 1-07B project manager or designee will enter all required information into an electronic database and perform an accuracy check. The updated database files are then secured on a network server, and copies are made available to the project team for their use.

The project's data management plan will present guidance to ensure that all data to be used in support of the remedial action report, Agency performance reviews, and ultimately the completion of the remedy are accurate, accessible, and complete. The data management plan will include the following topics:

- Organization and responsibilities
- Data collection planning
- Laboratory reporting requirements
- Sample identification
- Record control and sample custody
- Electronic data compilation and storage
- Data accessibility and reporting
- Data security.

Reporting requirements for MNA groundwater-monitoring results are defined in the Remedial Action Work Plan (DOE-ID 2003). All MNA groundwater-monitoring information will be compiled in the MNA annual report and will be provided to the Agencies. In addition, quality-assured sampling results will be submitted to the Agencies as they become available. Non-quality-assured data that support decision-making will be submitted as they become available. Data will be submitted to the Agencies in both electronic and hardcopy formats, as appropriate.

6. MAINTENANCE AND INSPECTIONS

To ensure that wells selected for MNA monitoring are available and in efficient operating condition for the project's long-term needs, it is necessary to have an effective maintenance program in place. Integral to the program are thorough inspections, routine/as-required maintenance, and comprehensive documentation of all activities.

Inspection and maintenance schedules will be developed on the basis of aquifer, well, and pump characteristics, as well as available resources to perform the work. The INEEL and project-specific well-maintenance plans may be implemented in addition to this plan. Maintenance and repair activities will be performed, as needed, when equipment failure or changes in the operating characteristics of the well, pump, or other installed equipment prevent attainment of program objectives. Following is a list of minimum inspection activities divided into surface and subsurface oriented tasks.

Surface inspections:

- Cement pad (cracking, chipping, settling, or washout)
- Benchmark brass cap and well identification tag (illegible or missing)
- Surrounding impingement posts (paint chipping, corrosion, or damage)
- Locking mechanism (wellhead box, hasp, and lock condition)
- Seal around the surface casing (gaps or cracked)
- Aboveground electrical wiring (frayed/exposed wires and plug condition).

Subsurface inspections:

- Pump (corrosion, wear or damage, and field test)
- Electrical wiring (frayed/exposed wires)
- Video log of the well (sediment accumulation inside the well screen, well bore, or well casing; corrosion; chemical/biological incrustation of the well screen or formation; or piping corrosion)
- Water-level measurements inside and outside of FLUTe® liners (to verify the integrity of the seal).

A schedule for maintenance activities will be developed using collected inspection information, manufacturer's recommendations, historical data, and reports of deteriorating performance. All maintenance activities shall be performed in accordance with site-specific and manufacturer's procedures and specifications. A summary of inspection and maintenance work will be included in the MNA annual report. As a minimum, the following records shall be maintained by, or be accessible to, program personnel:

- Well completion records with information on well lithology and construction
- Geophysical and video logs
- Pump specifications, manuals, and pumping performance

- Other installed equipment specifications and manuals
- Site-specific configuration information, such as wellhead boxes, locking mechanisms, installed equipment, and power requirements/availability
- Maps of well locations
- Applicable publications relating to equipment operation/maintenance and procedures
- Inspection records
- Maintenance and repair records.

This information also will be incorporated into the project's data management program, as appropriate.

7. INSTITUTIONAL CONTROLS

Institutional controls will consist of engineering and administrative controls to protect current and future users from health risks associated with contaminated groundwater by preventing ingestion of groundwater having COC concentrations exceeding risk-based thresholds. Land areas above contaminated groundwater will be placed under institutional controls until required risk-based and other regulatory criteria are achieved. The institutional controls for MNA will be maintained in accordance with the *Institutional Control Plan for the Test Area North Waste Area Group 1* (INEEL 2000)and will be governed ultimately by the overall Waste Area Group (WAG) 10 Sitewide Institutional Control Plan.

Administrative controls shall include postings on wellheads identifying potential hazards and placing written notification of this remedial action in the facility land-use master plan. The notification in the land-use master plan shall:

- Identify/map the area of contamination; this map must include the institutional control boundary defining the anticipated 30% growth of the plume and an extra 10% buffer.
- Prohibit installation of any drinking water and agricultural wells accessing the aquifer within the contaminated plume and buffer zone, as described in the Record of Decision Amendment (DOE-ID 2001b).
- Require that all wells within the plume boundaries be locked and accessible only by program personnel.
- Prohibit drilling or water use in the area approximately 2 mi south of TAN and require program approval for any drilling near TAN.
- Prohibit engaging in any activities that would interfere with the remedial activity.

A copy of the land-use master plan shall be made available to the U.S. Bureau of Land Management (BLM), county planners, and other organizations that might be affected. In addition, a request will be made that the BLM place a similar notification in their property management records for this site. The U.S. Department of Energy (DOE) shall provide the EPA and the State of Idaho with written verification that notifications, including BLM notification, have been made.

Engineering controls also shall be implemented. Devices and controls to restrict access to water from within the contaminated plume, including locking devices on wellheads, are required.

8. SAFETY AND HEALTH

Specific health and safety requirements are covered in the Health and Safety Plan (INEEL 2002a). This Health and Safety Plan has been prepared to meet the requirements of 29 *Code of Federal Regulations* (CFR) 1910.120/1926.65, "Hazardous Waste Operations and Emergency Response." The Health and Safety Plan governs all work that is performed by employees of the INEEL management and operations contractor, subcontractors or subtier subcontractors to the management and operations contractor, and employees of other companies or DOE laboratories. In general, it is the responsibility of MNA personnel to ensure that only well-planned and safe activities are performed in support of the groundwater-monitoring program.

9. PROJECT REPORTING

The MNA project reporting will consist of periodic performance reviews and preparation of several key documents during and after the MNA remedial action. The MNA annual reports will help evaluate the progress of the remediation. The remedial action report will document that the remediation is operational and functional. This plan may be revised periodically, as necessary. The operations, monitoring, and maintenance report will be prepared at the end of the remedial action.

9.1 Performance Reviews

The Agencies will evaluate the performance and compliance monitoring activities at the completion of the performance operations phase. Periodic performance reviews will be conducted at least every 5 years throughout the long-term operations phase. Reviews that are more frequent may be conducted, if circumstances warrant. These reviews will consist of evaluating MNA's progress, as documented in annual performance reports. A final review will be conducted at the end of the remedy.

9.2 Annual Monitored Natural Attenuation Performance Report

At the completion of each sampling event, monitoring data will be compiled and published. All MNA groundwater-monitoring information will be compiled in the MNA annual report and will be provided to the Agencies. Information reported will include analytical results, SAP tables, trend analyses, interpretations, and operational changes. The report will include QC and QA results and discussions of any discrepancies from this plan. Any maintenance or repair activities associated with the monitoring wells also will be documented in these reports. The annual report will document progress of the MNA remedy toward meeting the performance criteria and RAOs and will support Agency 5-year reviews. Data compiled in the annual report will be summarized with other remedial components in an annual remedy-performance summary report, as described in the Remedial Design/Remedial Action Scope of Work (DOE-ID 2001a).

9.3 Remedial Action Report

An MNA remedial action report will be prepared at the completion of the performance operations phase for Zones 1 2, as specified in the Remedial Action Work Plan (DOE-ID 2003). The remedial action report will be a primary document with draft, draft final, and final submittals to the Agencies for review and comment. The report for Zone 1 will be prepared in 2013, as prescribed in the Remedial Action Work Plan (DOE-ID 2003). The submittal date for the Zone 2 report will be determined in the remedial action report for Zone 1. The remedial action report will provide a detailed evaluation of MNA's effectiveness and will document the determination of whether the remedial action is operational and functional. The remedial action report will identify a schedule for modifying this plan to incorporate any necessary operational changes resulting from performance operations. The remedial action report also will provide details on the requirements for long-term monitoring and determining completion of the MNA remedial action.

9.4 Operations, Monitoring, and Maintenance Report

As addressed in the Remedial Design/Remedial Action Scope of Work (DOE-ID 2001a), an operations, monitoring, and maintenance report will be prepared and submitted to the Agencies at the completion of all operations, monitoring, and maintenance activities. The operations, monitoring, and maintenance report will be a primary document and will include a draft, draft final, and final submittal. The purpose of the operations, monitoring, and maintenance report will be to provide information that

will support an Agency decision that the remedial action has been successful in meeting RAOs. This will include information indicating that COC concentrations in the contaminated groundwater plume have been (1) reduced to below MCLs, (2) reduced to a cumulative carcinogenic risk of less than 1.0E-04, and (3) reduced to a hazard index of less than one. The operations, monitoring, and maintenance report will include the following:

- Description of operations, monitoring, and maintenance activities performed
- Results of remedy performance monitoring
- Summary of remedy long-term monitoring
- Determination that RAOs have been achieved.

The draft final and final documents will include responses to Agency comments. The submittal date for the operations, monitoring, and maintenance report will be established after submission of the remedial action report.

10. DOCUMENTS TO BE PREPARED

A number of specific work control procedures are required in order to implement this plan. In addition to those already in use at the INEEL, a data management plan for OU 1-07B has been identified as needing to be developed. This plan will provide project-specific instructions for recording and maintaining required information. The plan will specify required data fields and will provide instructions for completing SAP tables, receiving and entering data, and performing quality assurance checks of data accuracy.

A well maintenance plan for OU 1-07B also might be developed, based on the activities described in Section 6, if necessary. To ensure proper execution of the MNA groundwater-monitoring program, existing work control documents also will need to be updated periodically as equipment and procedures change. Additional work-control documentation may be identified in the future, as defined by the OU 1-07B project manager.

11. REFERENCES

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49 CFR 171, 2003, "General Information, Regulations, and Definitions," *Code of Federal Regulations,* Office of the Federal Register, June 2003.

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Appendix A

Well Construction Information for the Operable Unit 1-07B Monitored-Natural-Attenuation Monitoring Wells

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Table A-1. Well construction information for the Operable Unit 1-07B monitored-natural-attenuation monitoring wells.

Well Name	Well ID	Elevation at Top of Casing (ft above msl, NGVD29)	Well Total Depth (ft bls)	Production Interval(s) (ft bls)	Screen Type	Screen Material	Pump Type	Sampling Depth (ft bls)	Pump Discharge Line or Pipe Diameter (in.)	Discharge Line or Pipe Material	Length of Discharge Line (ft)	Estimated Purge Volume (gal)
TAN-16	752	4,788.81	323	302–322	ss	ss	RF2	307	1	ss	306	37
TAN-21	793	4,789.2	519.50	431–451	ss	ss	RF4	432	1	ss	440	53
TAN-51[a]	1316	4,788.59	470.00	NA	o	NA	FLUTe	240	0.25	PVDF/nylon	Varies	9
TAN-51[a]	—	—	—	—	—	—	—	263	—	—	—	—
TAN-51[a]	—	—	—	—	—	—	—	283.5	—	—	—	—
TAN-51[a]	—	—	—	—	—	—	—	322	—	—	—	—
TAN-51[a]	—	—	—	—	—	—	—	342	—	—	—	—
TAN-51[a]	—	—	—	—	—	—	—	342B	—	—	—	—
TAN-51[a]	—	—	—	—	—	—	—	367	—	—	—	—
TAN-51[a]	—	—	—	—	—	—	—	413	—	—	—	—
TAN-51[a]	—	—	—	—	—	—	—	460	—	—	—	—
TAN-54[a]	1340	4,789.36	474.00	NA	o	NA	FLUTe	234	0.25	PVDF/nylon	Varies	9
TAN-54[a]	—	—	—	—	—	—	—	318	—	—	—	—
TAN-54[a]	—	—	—	—	—	—	—	330.5	—	—	—	—
TAN-54[a]	—	—	—	—	—	—	—	347	—	—	—	—
TAN-54[a]	—	—	—	—	—	—	—	373	—	—	—	—
TAN-54[a]	—	—	—	—	—	—	—	394	—	—	—	—
TAN-54[a]	—	—	—	—	—	—	—	420	—	—	—	—
TAN-54[a]	—	—	—	—	—	—	—	460	—	—	—	—
TAN-55[a]	1341	4,789.64	470.00	NA	o	NA	FLUTe	221	0.25	PVDF/nylon	Varies	9
TAN-55[a]	—	—	—	—	—	—	—	251	—	—	—	—
TAN-55[a]	—	—	—	—	—	—	—	265	—	—	—	—
TAN-55[a]	—	—	—	—	—	—	—	317	—	—	—	—
TAN-55[a]	—	—	—	—	—	—	—	332	—	—	—	—
TAN-55[a]	—	—	—	—	—	—	—	373.5	—	—	—	—
TAN-55[a]	—	—	—	—	—	—	—	404	—	—	—	—
TAN-55[a]	—	—	—	—	—	—	—	439	—	—	—	—
TAN-55[a]	—	—	—	—	—	—	—	449	—	—	—	—
TAN-55[a]	—	—	—	—	—	—	—	461	—	—	—	—
TAN-52[a]	1317	4,788.00	470.00	NA	o	NA	FLUTe	220	0.25	PVDF/nylon	Varies	9
TAN-52[a]	—	—	—	—	—	—	—	242	—	—	—	—
TAN-52[a]	—	—	—	—	—	—	—	266	—	—	—	—
TAN-52[a]	—	—	—	—	—	—	—	303	—	—	—	—

Table A-1. (continued).

Well Name	Well ID	Elevation at Top of Casing (ft above msl, NGVD29)	Well Total Depth (ft bls)	Production Interval(s) (ft bls)	Screen Type	Screen Material	Pump Type	Sampling Depth (ft bls)	Pump Discharge Line or Pipe Diameter (in.)	Discharge Line or Pipe Material	Length of Discharge Line (ft)	Estimated Purge Volume (gal)
TAN-52[a]	—	—	—	—	—	—	—	361	—	—	—	—
TAN-52[a]	—	—	—	—	—	—	—	373	—	—	—	—
TAN-52[a]	—	—	—	—	—	—	—	395	—	—	—	—
TAN-52[a]	—	—	—	—	—	—	—	438	—	—	—	—
TAN-52[a]	—	—	—	—	—	—	—	456	—	—	—	—
ANP-8	76	4,790.52	309.20	232.8–304.65	p	steel	Barcad	268	0.25	poly	267	4.75
TAN-25	1117	4,783.25	315.00	217–297	s	ss	RF4	218	1	galv	218	27
TAN-28	1008	4,789.02	262.00	220–260	s	ss	RF4, 5E8	242	0.75	ss	241.5	17
TAN-29	1010	4,783.61	265.00	222.25–262.25	s	ss	RF4, 16E4	253	1	ss	253.2	31
TAN-30A	1012	4,784.03	320.90	300–320	s	ss	RF4, 5E8	313	0.75	ss	312.7	22
TAN-37A	1163	4,784.35	415.90	204–416	o	NA	RF2	240	0.5	ss	250	8
TAN-37B	1163	4,784.35	415.90	204–416	o	NA	RF2	272	1	poly	275	9
TSF-05A	71	4,782.18	310.00	180–244	p	Steel	RF2	235	0.5	poly	275	9
TSF-05B	71	4,782.18	310.00	269–305	p	Steel	RF2	270	0.5	poly	275	9
TAN-56[a]	1342	4,790.05	460.00	NA	o	NA	FLUTe	223	0.375	PVDF/nylon	348	7.65
TAN-56[a]	—	—	—	—	—	—	—	242	—	—	348	7.65
TAN-56[a]	—	—	—	—	—	—	—	275	—	—	348	7.65
TAN-56[a]	—	—	—	—	—	—	—	334	—	—	348	7.65
TAN-56[a]	—	—	—	—	—	—	—	387	—	—	348	7.65
TAN-56[a]	—	—	—	—	—	—	—	403	—	—	348	7.65
TAN-56[a]	—	—	—	—	—	—	—	454	—	—	348	7.65
TAN-57	1343	4790.30	491.00	221–491	o	NA	NP	353	—	—	—	25
TAN-58	1344	4791.70	483.00	220–483	o	NA	NP	295	—	—	—	25
GIN-4	162	4788.08	300	287–297	s	PVC	RF2	292	0.5	ss	292	9

a = Well was sampled at multiple depths.
p = perforated
poly = polyethylene
galv = galvanized
o = open hole
s = slotted
ss = stainless steel
RF2 = Grundfos RediFlo-2 pump
RF4 = Grundfos RediFlo-4 pump
FLUTe = Flexible Liner Underground Technologies®
NA = not applicable
NP = no pump
B = TAN-51 has two sample ports at a depth of 342 ft.
PVC = polyvinyl chloride
PVDF/nylon = polyvinylidene fluoride/nylon

Appendix B

Example Sampling and Analysis Plan Tables

Appendix B

Example Sampling and Analysis Plan Tables

Sampling and Analysis Plan Table for Chemical and Radiological Analysis

Plan Table Number: MNA-PERFORMANCE

DRAFT

SAP Number: DOE/ID-11086

Date: 05/13/2003 Plan Table Revision: 3.0 Project: MNA PERFORMANCE OPERATIONS (ANNUAL) Project Manager: SMO Contact: KIRCHNER, D. R.

Sample Description						Sample Location				Enter Analysis Types (AT) and Quantity Requested																				
Sampling Activity	Sample Type	Sample Matrix	Coll Type	Sampling Method	Planned Date	Area	Type of Location	Location	Depth (ft)	AT1	AT2	AT3	AT4	AT5	AT6	AT7	AT8	AT9	AT10	AT11	AT12	AT13	AT14	AT15	AT16	AT17	AT18	AT19	AT20
										R4	R6	R8	U4	VA	VE															
MNA050	REG	GROUND WATER	GRAB		/ /	TAN	MONITORING WELL	TAN-51 (1316)	249			1		1																
MNA051	REG	GROUND WATER	GRAB		/ /	TAN	MONITORING WELL	TAN-51 (1316)	263			1		1																
MNA052	REG	GROUND WATER	GRAB		/ /	TAN	MONITORING WELL	TAN-51 (1316)	283.5			1		1																
MNA053	REG	GROUND WATER	GRAB		/ /	TAN	MONITORING WELL	TAN-51 (1316)	322			1			1															
MNA054	REG	GROUND WATER	GRAB		/ /	TAN	MONITORING WELL	TAN-51 (1316)	342			1		1																
MNA055	REG/QC	GROUND WATER	DUP		/ /	TAN	MONITORING WELL	TAN-51 (1316)	342B			2		2																
MNA056	REG	GROUND WATER	GRAB		/ /	TAN	MONITORING WELL	TAN-51 (1316)	367			1		1																
MNA057	REG	GROUND WATER	GRAB		/ /	TAN	MONITORING WELL	TAN-51 (1316)	413			1		1																
MNA058	REG	GROUND WATER	GRAB		/ /	TAN	MONITORING WELL	TAN-51 (1316)	460			1		1																
MNA059	REG	GROUND WATER	GRAB		/ /	TAN	MONITORING WELL	TAN-54 (1340)	234			1		1																
MNA060	REG	GROUND WATER	GRAB		/ /	TAN	MONITORING WELL	TAN-54 (1340)	316			1		1																
MNA061	REG	GROUND WATER	GRAB		/ /	TAN	MONITORING WELL	TAN-54 (1340)	330.5			1		1																
MNA062	REG	GROUND WATER	GRAB		/ /	TAN	MONITORING WELL	TAN-54 (1340)	347			1		1																
MNA063	REG	GROUND WATER	GRAB		/ /	TAN	MONITORING WELL	TAN-54 (1340)	373			1		1																
MNA064	REG	GROUND WATER	GRAB		/ /	TAN	MONITORING WELL	TAN-54 (1340)	394			1		1																

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AT1: Gamma Spec

AT2: Sr-90

AT3: Tritium

AT4: U-234

AT5: VOCs (TAL)

AT6: VOCs (TAL) - MS/MSD

AT7:

AT8:

AT9:

AT10:

The complete sample identification number (10 characters) will appear on field guidance forms and sample labels.

AT11:

AT12:

AT13:

AT14:

AT15:

AT16:

AT17:

AT18:

AT19:

AT20:

Comments:

VOCs TAL = vinyl chloride, trichloroethene, tetrachloroethene, cis-1,2-dichloroethene, trans-1,2-dichloroethene

Gamma Spec = analyte of concern is Cs-137

Analysis Suites:

Contingencies:

Sampling and Analysis Plan Table for Chemical and Radiological Analysis

Plan Table Number: MNA-PERFORMANCE

DRAFT

SAP Number: DOE/ID-11066

Date: 05/13/2003 Plan Table Revision: 3.0 Project: MNA PERFORMANCE OPERATIONS (ANNUAL) Project Manager: SMO Contact: KIRCHNER, D. R.

Sample Description						Sample Location				Enter Analysis Types (AT) and Quantity Requested																			
Sampling Activity	Sample Type	Sample Matrix	Coll Type	Sampling Method	Planned Date	Area	Type of Location	Location	Depth (ft)	AT1	AT2	AT3	AT4	AT5	AT6	AT7	AT8	AT9	AT10	AT11	AT12	AT13	AT14	AT15	AT16	AT17	AT18	AT19	AT20
										R4	RB	R8	U4	VA	VE														
MNA065	REG	GROUND WATER	GRAB		/ /	TAN	MONITORING WELL	TAN-54 (1340)	420			1			1														
MNA066	REG	GROUND WATER	GRAB		/ /	TAN	MONITORING WELL	TAN-54 (1340)	460			1		1															
MNA067	REG	GROUND WATER	GRAB		/ /	TAN	MONITORING WELL	TAN-55 (1341)	221			1		1															
MNA068	REG	GROUND WATER	GRAB		/ /	TAN	MONITORING WELL	TAN-55 (1341)	251			1		1															
MNA069	REG	GROUND WATER	GRAB		/ /	TAN	MONITORING WELL	TAN-55 (1341)	265			1		1															
MNA070	REG	GROUND WATER	GRAB		/ /	TAN	MONITORING WELL	TAN-55 (1341)	317			1		1															
MNA071	REG	GROUND WATER	GRAB		/ /	TAN	MONITORING WELL	TAN-55 (1341)	332			1		1															
MNA072	REG	GROUND WATER	GRAB		/ /	TAN	MONITORING WELL	TAN-55 (1341)	373.5			1		1															
MNA165	REG	GROUND WATER	GRAB			TAN	MONITORING WELL	TAN-55 (1341)	404			1		1															
MNA166	REG	GROUND WATER	GRAB			TAN	MONITORING WELL	TAN-55 (1341)	439			1		1															
MNA167	REG	GROUND WATER	GRAB			TAN	MONITORING WELL	TAN-55 (1341)	449			1		1															
MNA168	REG	GROUND WATER	GRAB			TAN	MONITORING WELL	TAN-55 (1341)	461			1		1															
MNA169	REG	GROUND WATER	GRAB			TAN	MONITORING WELL	TAN-52 (1317)	220			1		1															
MNA170	REG	GROUND WATER	GRAB			TAN	MONITORING WELL	TAN-52 (1317)	242			1		1															
MNA171	REG	GROUND WATER	GRAB			TAN	MONITORING WELL	TAN-52 (1317)	265			1		1															

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AT1: Gamma Spec

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AT5: VOCs (TAL)

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AT7:

AT8:

AT9:

AT10:

AT11:

AT12:

AT13:

AT14:

AT15:

AT16:

AT17:

AT18:

AT19:

AT20:

Comments:

VOCs TAL = vinyl chloride, trichloroethene, tetrachloroethene, cis-1,2-dichloroethene, trans-1,2-dichloroethene

Gamma Spec = analyte of concern is Cs-137

Analysis Suites:

Contingencies:

Sampling and Analysis Plan Table for Chemical and Radiological Analysis

Plan Table Number: MNA-PERFORMANCE

DRAFT

SAP Number: DOE/ID-11086

Date: 05/13/2003 Plan Table Revision: 3.0 Project: MNA PERFORMANCE OPERATIONS (ANNUAL) Project Manager: SMO Contact: KIRCHNER, D. R.

Sample Description					Planned Date	Sample Location				Enter Analysis Types (AT) and Quantity Requested																			
Sampling Activity	Sample Type	Sample Matrix	Coll Type	Sampling Method		Area	Type of Location	Location	Depth (ft)	AT1	AT2	AT3	AT4	AT5	AT6	AT7	AT8	AT9	AT10	AT11	AT12	AT13	AT14	AT15	AT16	AT17	AT18	AT19	AT20
										R4	RB	R8	U4	VA	VE														
MNA172	REG/QC	GROUND WATER	DUP			TAN	MONITORING WELL	TAN-52 (1317)	303			2		2															
MNA173	REG	GROUND WATER	GRAB			TAN	MONITORING WELL	TAN-52 (1317)	361			1		1															
MNA174	REG	GROUND WATER	GRAB			TAN	MONITORING WELL	TAN-52 (1317)	373			1		1															
MNA175	REG	GROUND WATER	GRAB			TAN	MONITORING WELL	TAN-52 (1317)	395			1		1															
MNA176	REG	GROUND WATER	GRAB			TAN	MONITORING WELL	TAN-52 (1317)	438			1		1															
MNA177	REG	GROUND WATER	GRAB			TAN	MONITORING WELL	TAN-52 (1317)	456			1		1															
MNA178	REG	GROUND WATER	GRAB			TAN	MONITORING WELL	GIN-4 (152)	292			1		1															
MNA179	REG	GROUND WATER	GRAB			TAN	MONITORING WELL	ANP-8 (76)	268			1		1															
MNA180	REG	GROUND WATER	GRAB			TAN	MONITORING WELL	TAN-21 (793)	432			1		1															
MNA181	REG	GROUND WATER	GRAB			TAN	MONITORING WELL	TAN-16 (752)	307			1		1															
MNA182	REG	GROUND WATER	GRAB			TAN	MONITORING WELL	TAN-25 (1117)	218	1	1	1	1																
MNA183	REG	GROUND WATER	GRAB			TAN	MONITORING WELL	TAN-28 (1006)	242	1	1	1	1																
MNA184	REG	GROUND WATER	GRAB			TAN	MONITORING WELL	TAN-29 (1010)	253	1	1	1	1																
MNA185	REG	GROUND WATER	GRAB			TAN	MONITORING WELL	TAN-30A (1012)	313	1	1	1	1																
MNA186	REG	GROUND WATER	GRAB			TAN	MONITORING WELL	TAN-37A (1163)	240	1	1	1	1																

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AT7:

AT8:

AT9:

AT10:

AT11:

AT12:

AT13:

AT14:

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AT19:

AT20:

Comments:

VOCs TAL = vinyl chloride, trichloroethene, tetrachloroethene, cis-1,2-dichloroethene, trans-1,2-dichloroethene

Gamma Spec = analyte of concern is Cs-137

Analysis Suites:

Contingencies:

Sampling and Analysis Plan Table for Chemical and Radiological Analysis

Plan Table Number: MNA-PERFORMANCE

DRAFT

SAP Number: DOE/ID-11066

Date: 05/13/2003 Plan Table Revision: 3.0 Project: MNA PERFORMANCE OPERATIONS (ANNUAL) Project Manager: SMO Contact: KIRCHNER, D. R.

Sample Description					Planned Date	Sample Location				Enter Analysis Types (AT) and Quantity Requested																	
										AT1	AT2	AT3	AT4	AT5	AT6	AT7	AT8	AT9	AT10	AT11	AT12	AT13	AT14	AT15	AT16	AT17	AT18	AT19	AT20
Sampling Activity	Sample Type	Sample Matrix	Coll Type	Sampling Method		Area	Type of Location	Location	Depth (ft)	R4	RB	R8	U4	VA	VE														
MNA187	REG	GROUND WATER	GRAB			TAN	MONITORING WELL	TAN-37B (1163)	272	1	1	1	1																
MNA188	REG	GROUND WATER	GRAB			TAN	MONITORING WELL	TSG-05A (71)	235	2	2	2	2																
MNA189	REG/QC	GROUND WATER	DUP			TAN	MONITORING WELL	TSG-05B (71)	270	2	2	2	2																
MNA190	REG	GROUND WATER	GRAB			TAN	MONITORING WELL	TAN-56 (1342)	223			1		1															
MNA191	REG	GROUND WATER	GRAB			TAN	MONITORING WELL	TAN-56 (1342)	242			1		1															
MNA192	REG	GROUND WATER	GRAB			TAN	MONITORING WELL	TAN-56 (1342)	275			1		1															
MNA193	REG/QC	GROUND WATER	DUP			TAN	MONITORING WELL	TAN-56 (1342)	334			2		2															
MNA194	REG	GROUND WATER	GRAB			TAN	MONITORING WELL	TAN-56 (1342)	387			1		1															
MNA195	REG	GROUND WATER	GRAB			TAN	MONITORING WELL	TAN-56 (1342)	403			1		1															
MNA196	REG	GROUND WATER	GRAB			TAN	MONITORING WELL	TAN-56 (1342)	454			1		1															
MNA197	REG	GROUND WATER	GRAB			TAN	MONITORING WELL	TAN-57 (1343)	353			1			1														
MNA198	REG	GROUND WATER	GRAB			TAN	MONITORING WELL	TAN-58 (1344)	295			1		1															
MNA199	QC	WATER	FBLK			TAN	FIELD BLANK	QC	NA			1		1															
MNA205	QC	WATER	FBLK			TAN	FIELD BLANK	QC	NA			1		1															
MNA206	QC	WATER	FBLK			TAN	FIELD BLANK	QC	NA			1		1															

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AT5: VOCs (TAL)

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AT7:

AT8:

AT9:

AT10:

AT11:

AT12:

AT13:

AT14:

AT15:

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AT18:

AT19:

AT20:

Comments:

VOCs TAL = vinyl chloride, trichloroethene, tetrachloroethene, cis-1,2-dichloroethene, trans-1,2-dichloroethene

Gamma Spec = analyte of concern is Cs-137

Analysis Suites:

Contingencies:

Sampling and Analysis Plan Table for Chemical and Radiological Analysis

Plan Table Number: MNA-PERFORMANCE

DRAFT

SAP Number: DOE/ID-11066

Date: 05/13/2003 Plan Table Revision: 3.0 Project: MNA PERFORMANCE OPERATIONS (ANNUAL) Project Manager: SMO Contact: KIRCHNER, D. R.

Sample Description					Planned Date	Sample Location				Enter Analysis Types (AT) and Quantity Requested																			
										AT1	AT2	AT3	AT4	AT5	AT6	AT7	AT8	AT9	AT10	AT11	AT12	AT13	AT14	AT15	AT16	AT17	AT18	AT19	AT20
Sampling Activity	Sample Type	Sample Matrix	Coll Type	Sampling Method		Area	Type of Location	Location	Depth (ft)	R4	RB	R8	U4	VA	VE														
MNA207	QC	WATER	TBLK			TAN	TRIP BLANK	QC	NA					1															
MNA208	QC	WATER	TBLK			TAN	TRIP BLANK	QC	NA					1															
MNA209	QC	WATER	TBLK			TAN	TRIP BLANK	QC	NA					1															
MNA210	QC	WATER	TBLK			TAN	TRIP BLANK	QC	NA					1															

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AT5: VOCs (TAL)

AT6: VOCs (TAL) - MS/MSD

AT7:

AT8:

AT9:

AT10:

AT11:

AT12:

AT13:

AT14:

AT15:

AT16:

AT17:

AT18:

AT19:

AT20:

Comments:

VOCs TAL = vinyl chloride, trichloroethene, tetrachloroethene, cis-1,2-dichloroethene, trans-1,2-dichloroethene

Gamma Spec = analyte of concern is Cs-137

Analysis Suites:

Contingencies:

Appendix C

Agency Comments and Resolutions for the Draft Version of the Monitored Natural Attenuation Operations, Monitoring, and Maintenance Plan

Project Name:	Document Owner: Joe Rothermel	Phone Number:	Reviewer's Name/Discipline: EPA
Comments resolved by:	E-Mail Address:		Phone Number:
Doc ID: **DOE/ID-11066**	Document Title: **MNA OM&M Plan**		Rev. No.: **Rev. A**

Item No.	Page No./ Section/Zone	Review Comment	Comment Resolution
1	GENERAL	The OM&M Plan does not provide sufficient details or the specifics of subjects such as the electron donor source and the groundwater plume modeling. Additional discussion should be included in the text that provides information, data, and interpretation to support the proposed monitoring plan. (JR)	The OM&M plan will be revised to be more clearly understood regarding operational and maintenance activities. Reference for the new well maintenance plan will be included in O&M Plan. The OM&M plan is designed to be an implementation document rather than a technical reference. The technical justification for the MNA monitoring strategy is developed in the RAWP. The mechanism for natural attenuation of TCE, including the cometabolic substrate, is currently under investigation and will be discussed in detail in the RA Report. The modeling is described in detail in a separate document.
2	GENERAL	The proposed monitoring strategy in both the RAWP and the OMMP, which specifies implementing an annual sampling schedule for only the first 5 years, is not adequate. Since the half-life for trichloroethene (TCE) is estimated at 10 to 13 years, the proposed annual sampling frequency should be extended beyond the proposed 5-year period. The long-term strategy between the initial 5-year period until such time as the RAOs are achieved should also be specified in greater detail in both documents. (JR)	Per the strategy developed at the face-to-face meeting, the monitoring plan will be revised to include annual sampling in Zones 1 and 2 at least through 2013. As discussed at the face-to-face meeting, it is recommended that the long-term monitoring strategy be established after the RA Report is available.

Item No.	Page No./ Section/Zone	Review Comment	Comment Resolution
3	Page 2-1 DOE/ID-11066 § 2.2 1st Bullet	** Given the proposed 13-year half-life for TCE, and the 3-year rolling average proposed for trend analysis, annual groundwater monitoring for only 5 years will only provide three rolling average data results packages (5th year sampling results would not likely be available) before transition to less frequent sampling. Therefore, a minimum of 7 years of annual monitoring will be necessary. The frequency of monitoring after this period may be at 5-year intervals, depending upon trend analysis of the data.	Per the strategy developed at the face-to-face meeting, the monitoring plan will be revised to include annual sampling in Zones 1 and 2 at least through 2013.
4	Page 2-2 DOE/ID-11066 § 2.3 #1	It may be simpler if this DQO were broken into its two component parts of plume expansion and VOC degradation to simplify the DQO process.	The DQOs will be revised accordingly, per the strategy developed at the face-to-face meeting. The suggestion to separate degradation from plume expansion is well taken and will be incorporated.
5	Page 2-2 DOE/ID-11066 § 2.3 #2	It should be noted that the 5-ug/L TCE isopleth is based on the current MCL and would need to change if the MCL changes.	The OMMP is a lower tier implementation document. Should the ROD be revised in the future to address new MCLs (or an ESD issued), the RAWP and supporting documents would also need to be modified. No change to the OMMP is recommended at this time.
6	Page 2-2 DOE/ID-11066 § 2.3 #3	Since they are not being treated by the NPTF, it is important to single out the radionuclide flux upgradient of the distal zone. However, it should be noted that MNA requires that the upgradient flux of all contaminants be below MCLs and cumulative risk RAOs.	A discussion of current data (from the 2002 Annual Report) regarding evidence of Sr-90 sorption will be added to the technical basis section of the RAWP. The RAWP and OMMP will describe the collection of radionuclide data during performance operations so that a detailed radionuclide study can be included in the MNA Zone 1 RA Report. Currently, the radionuclide flux from the medial zone to the distal zone is below MCLs and there is no reason, based on historical data, to expect this will change. NPTF effluent must be below MCLs so there does not appear to be a mechanism for radionuclides to increase from medial zone operations.
7	Page 3-1 DOE/ID-11066 § 3.1.2 & General	** The performance operations phase should last at least 7 years of annual groundwater.	Per the strategy developed at the face-to-face meeting, the monitoring plan will be revised so that performance operations (including annual sampling) runs from 2003 to 2013 in Zone 1.

Item No.	Page No./ Section/Zone	Review Comment	Comment Resolution
8	Page 5-13 DOE/ID-11066 §5.3.2.5	What about long-term operations annual monitoring of TAN-56? Plume growth may not behave the same as TCE degradation.	Per the strategy developed at the face-to-face meeting, a monitoring program will be implemented to determine the extent of plume expansion in relation to the longitudinal plume axis. The frequency of sampling in Zone 3 was set at every three years. We have not measured an observable change in plume size over the last 7 years, so a monitoring frequency of every three years is thought to be conservative. Also, the OMMP will be modified to reflect the use of GIN-4 as one initial plume size indicator well and a TCE concentration of 10 ug/L as a concentration threshold, shifting to TAN-56, and subsequently to a new well.
9	Page 7-1 DOE/ID-11066 §7, 3rd Bullet	** It is unclear what this bullet means (e.g., the other bullets do not prohibit installing an injection well in the plume). How will this performance requirement be measured?	The bullets describe notifications that would be placed in the Land Use Master Plan. The third bullet is intentionally vague to cover the concept we have discussed over the years – no future activities can interfere with implementation of the remedy. Those activities would include impacts to infrastructure (i.e., buildings, power, roads, well heads and the like) and impacts to hydrology (extraction and injection). We could add some examples to the bullet, but it needs to be general in nature to allow conservative discretion at the time of an event. Per our teleconference, the notification will also require that all wells be locked and accessible by program personnel only; no drilling w/o program approval; copies of notification be made available to BLM, counties, and other organizations; no drilling or water use in the area 2 miles south of TAN.

Project Name:		Document Owner: Joe Rothermel	Phone Number:	Reviewer's Name/Discipline: IDEQ
Comments resolved by:		E-Mail Address:		Phone Number:
Doc ID: **DOE/ID-11066**		Document Title: **MNA OM&M Plan**		Rev. No.: **Rev. A**
Item No.	Page No./ Section/Zone	Review Comment		Comment Resolution
1	Page 2-1 Section 2.2, Compliance Objectives, Bullet 1	The timing for conducting the groundwater monitoring is portrayed in a step-wise fashion in that annual sampling will shift to a 5-year cycle after the first 5 years or as determined during the 5-year review process. Annual sampling is not sufficient for the first 5 years; semi-annual sampling is needed during this key time frame. IDEQ is concerned with the proposed shift in monitoring schedules and the relationship of the schedule to the funding cycle. It may be necessary to extend the semi-annual sampling or a different sampling frequency can be selected other than the proposed 5-year frequency. The agencies need to discuss the lead-time needed by DOE for funding purposes to allow the selection of an appropriate, future sampling frequency. The potential need to continue semi-annual sampling or to go to a frequency between semi-annual and every 5 years needs to be addressed so that needed data are collected and are not hindered by budget constraints.		As agreed to in the strategy developed at the Agency face-to-face meeting, the monitoring plan will be revised to include annual sampling in Zones 1 and 2 at least through 2013. The techniques by which MNA will be evaluated will be described in the RAWP. It is our recommendation that the sampling plan for long-term operations be established by the Agencies at the end of performance operations, based on the conclusions of the RA Report.
2	Page 3-1 Section 3.1.1, 1st Bullet	As we have little data for the majority of the monitoring wells in the distal portion of the plume. The two proposed sampling events will not provide much data to evaluate the effectiveness of MNA with. We need to discuss alternatives as to how we intend to evaluate/verify MNA then determine the data we need to collect to meet this objective.		Per the strategy developed at the Agency face-to-face meeting, the monitoring plan will be revised to include annual sampling in Zones 1 and 2 at least through 2013. The techniques by which MNA will be evaluated will be described in the RAWP.

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3	Page 3-2 Section 3.1, Figure 3-1	The text describing the decision point between "Performance Operations" and "Balance of Remedy" requires some editing. It is premature after only 2 years of "Initial Operations" and 5 years of "Performance Operations" to conclude that "identification of a mechanism for natural degradation of TCE eliminates the need for a contingency remedy, shortens the performance operations period, and initiates long-term operations." Data from the distal zone are not conclusive even with the identification of a mechanism for natural degradation and the extension of the operational period. It is probable that at least one-half for TCE will be needed to confidently predict the appropriate time to enter "long-term operations" after we have a mechanism identified which will quantify the half-life). Also, the ability to shelve the contingency remedy will not be possible until more than one-half for TCE has expired in order to assure the agencies that MNA is functioning as expected in the predicted time frame. Considering the low concentrations associated with the distal zone, it is possible that two half-lives will be needed to confidently draw the conclusions noted in this text. At this time, the first-order degradation rate for TCE appears to be on the order of 13 years (Monitored Natural Attenuation Remedial Action Work Plan for Test Area North Final Groundwater Remediation, Operable Unit 1-07B (Draft), Table 4-2, Page 4-14). The agencies need to discuss the time frames portrayed in this figure and discuss the relationship of these time frames to the probable half-life of TCE in the distal zone.	Per the strategy developed at the face-to-face meeting, the monitoring plan will be revised to include only performance operations, with annual sampling in Zones 1 and 2, through 2013 and longer if needed, as determined by the Agencies in the RA Report.
4	Page 3-5 Section 3.2, Table 3-2, Management of Data	Due to the volume of data, which will need to be generated, a data management plan is critical. In order to avoid future miscommunication and duplication of effort, we should discuss this issue in some detail now. At a minimum, an outline for data base requirements and format should be included in this report.	An Excel spread sheet will be provided in the 2002 Annual Report that lists the wells and data collected under the phase C GW monitoring plan. For future 1-07B data collection, a project-specific data management document will be developed. At this time, however, the details of how project specific procedures would fit into the overall INEEL long-term stewardship plans for data management have not been worked out. Nevertheless, the section will be modified to add additional detail, perhaps high-level functional requirements to guide the upcoming implementation.

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5	Page 4-1 Section 4, Figure 4-1	There have been discussions centered on replacing monitoring well TAN-48. This is a critical function since we are assuming TAN-51 and TAN-52 represent the suspected axis of the plume. Adequate monitoring of the axis of the plume is critical to our ability to determine risk and whether the RAOs will be met. The proposed distal MNA monitoring network currently appears inadequate to derive the necessary data to make these determinations. As the plan exists, the most contaminated 3,000 ft of the aquifer in the distal zone will not be monitored. Historical concentrations in TAN-48 are 2 to 3 times those in TAN-51. Therefore, this is the portion of the distal zone where evaluation of degradation rates is most important, as it will drive our RAO evaluations. It is approximately 2,600 ft from TAN-48 to TAN-51, at .35 ft/day (RAWP 2003); this is approximately 20 years travel time. It would take approximately 10 years for clean water from the NPTF injection well to affect a monitoring well constructed half way between the wells (i.e., 1,300 ft). Further, the identification of clean water in a well upgradient from TAN-51 would have several beneficial impacts regarding the effectiveness of the NPTF and on our assumptions concerning the axis of the plume and dispersion of contaminants.	As discussed at the Agency face-to-face, the recommended monitoring network will provide adequate coverage to verify the progress of the remedy. While it is true that there is no well between TAN-48 and –51, there is not a specific need for data in that area. Based on the widespread characterization of the plume as the last 7 years of monitoring, we have a reasonably good understanding of how the plume will behave in that area. TAN-51 will exhibit post-breakthrough degradation behavior soon. Having an upgradient observation point in what is now a higher concentration area may be interesting. It may also be of interest to see NPTF breakthrough water earlier. These possibilities, however, probably would not justify the cost of installing a new well, particularly when its utility would decrease substantially after about 10 years (1/10 of the remedy period). Please note that the 0.35 ft/day is a conservative average and the reinjection of NPTF water will significantly affect the water velocity that area.
6	Page 5-1 Section 5.1.1, 2nd Paragraph, Last Sentence	The plan needs to address and propose sampling frequencies and locations beyond the performance operations herein. We can caveat any long-term monitoring plans with the statement that it is anticipated the plans will be modified as data permits during the 5-year reviews. However, we cannot concur with an MNA remedial action plan with this level of proposed monitoring.	As discussed at the Agency face-to-face, it is recommended that the requirements for long term monitoring be determined by the Agencies in the RA Report.

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7	Page 5-3 Section 5.1.2, Table 5-2	The MDL for the VOC constituents may need to be modified for TCE and/or other constituents if the MCLs are modified in the future.	An ESD or ROD Amendment (Decision Document) revision may be necessary to make this change. The OMMP is a lower tier implementation document. Should the ROD be revised in the future to address new MCLs, the RAWP and supporting documents would also need to be modified. No change to the OMMP is recommended at this time.
8	Page 5-3 Section 5.1.3	See comment #3 concerning sampling strategy.	Per the strategy developed at the face-to-face meeting, the monitoring plan will be revised to include performance operations, with annual sampling in Zones 1 and 2, through 2013 and longer if needed, as determined by the Agencies in the RA Report.
9	Page 5-10 Section 5.3.2	We need a methodology to evaluate the effectiveness of MNA in this document. We also need to establish a quantitative standard, by which we can verify MNA or identify more effective methods in future documents.	It is our recommendation that sub-section 5.3 be removed from the OMMP as it is duplicative of a nearly identical section in the RAWP. Doing so will focus the OMMP on the operational aspects of maintaining and operating the monitoring network. In response to the comment, however, the effectiveness of MNA will be verified, as developed at the Agency face-to-face meeting, by conducting trend analyses on the concentration data to confirm or deny that the peak breakthrough of TCE has occurred at a time sufficient to meet RAOs. Other elements such as mechanism studies and plume growth will also factor into the methodology. The MNA assessment methodology and supporting technical basis will be established in the RAWP.

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10	Page 5-10 Section 5.3.2.1, Modeling History	This section describes the conversion of the transport model from TETRAD to MODFLOW. The resulting calibration effort resulted in longitudinal and transverse dispersivities of 2 m. IDEQ is very interested in seeing details related to the structure and calibration of the model. IDEQ understands the TETRAD and MODFLOW models are two-dimensional simulations. IDEQ is interested in discussing any sensitivity runs that may have been conducted regarding the effects of an increasing thickness of the active portion of the aquifer. This interest stems from the probable deepening of the QR interbed with distance from the source and the lack of continuity of the PQ interbed as evident from the last drilling campaign for OU 1-07B. The possibility that the active part of the aquifer, with respect to the transport of the TCE plume, increases with distance from the source raises the prospect that there may be a significant component of vertical dispersion that has not been accounted for in the modeling. IDEQ acknowledges that the two-dimensional model calibration with longitudinal and transverse dispersivities of 2 m diminishes the concern to a degree but IDEQ does desire further discussion of this facet.	It is our recommendation that sub-section 5.3 be removed from the OMMP as it is duplicative of a nearly identical section in the RAWP. Doing so will focus the OMMP on the operational aspects of maintaining and operating the monitoring network. In response to the comment, however, The early stages of the MNA remedy (first two years) specifically includes a requirement to verify and update the model as necessary. As this work is just beginning, we would recommend a scoping meeting amongst the IDEQ, EPA and DOE hydrologists to ensure that the key issues are identified and a plan for investigation is agreed to.
11	Page 5-12 Section 5.3.2.3, Paragraphs 1&3	The paragraph states “If plots of the concentrations over time suggest linear increases or decreases, a linear regression of the variable against time may be fit to the data or to the smoothed data.” The third paragraph notes the assumptions will be tested and linear regression will not be used on non-normal distributions but it still reads like linear regression is the preferred method of choice. It is suggested that the Mann-Kendall test for trend be used. The text also should state how the data would be checked for normality; the Shapiro-Wilk test is recommended. An experienced statistician should be consulted, not “may be consulted….”	It is our recommendation that sub-section 5.3 be removed from the OMMP as it is duplicative of a nearly identical section in the RAWP. Doing so will focus the OMMP on the operational aspects of maintaining and operating the monitoring network. In response to the comment, however, The discussion in the RAWP will be clarified to indicate that the most appropriate trend tests, based on the actual observed data, will be used during this evaluation. In addition, an experienced statistician will be consulted.

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12	Page 5-12 Section 5.3.2.4, Paragraph 2	Please clarify the last sentence to clearly state when the ten-year time frame begins. It appears the intent is to use the last ten years of data, which will shift each year as monitoring advances with time. Please state the trend analysis procedure that will be used and state the level of confidence that will be used with the trend analysis.	It is our recommendation that sub-section 5.3 be removed from the OMMP as it is duplicative of a nearly identical section in the RAWP. Doing so will focus the OMMP on the operational aspects of maintaining and operating the monitoring network. In response to the comment, however, the RAWP text will simply indicate that radionuclide data will be analyzed in the RA Report to verify that processes of sorption and decay are sufficiently attenuating the radionuclide COCs. Per the discussions at the face-to-face meeting, radionuclide data will be collected annually in Zone 1 through 2013.
13	Page 5-13 Section 5.3.2.5	There are several sentry wells near the 5µg/l isopleth in Figure 4-1, (MW-2, TAN-24A, GIN-02 and GIN-03), which indicate the plume has not expanded beyond these wells. We need a starting point and it appears to be significantly up gradient from TAN-56. Currently TAN-56 is approximately 1,370 ft down gradient from this line. In a 9,000-foot plume, this is about a 15% expansion to TAN-56. It appears that while monitoring of TAN-56 is important, so is monitoring of MW-2, TAN-24A, and either GIN-02 or GIN-03. The use of a 5-year period of concentration exceedance of the 5µg/l criteria to justify construction of an additional down gradient monitoring well may be acceptable. However, we need to establish a mechanism in this document to ensure that in the future, if we get an exceedance, sampling is performed on an annual basis for an adequate number of years to verify this exceedance. The last sentence of this paragraph needs to be more specific as to what is meant by "consistently exceed 5 µg/L (as measured over a 5-year period)…." Please specify an appropriate test and confidence level for making this determination.	It is our recommendation that sub-section 5.3 be removed from the OMMP as it is duplicative of a nearly identical section in the RAWP. Doing so will focus the OMMP on the operational aspects of maintaining and operating the monitoring network. In response to the comment, however, the monitoring plan will be revised to include GIN-4 as well as TAN-56, 57, 58 in Zone 3 (per the discussion at the Agency face-to-face). In addition, should concentrations at GIN-4 exceed 10 ug/L, the sampling frequency will be increased to annual. The DQOs and decision rules will be revised in the RAWP to clarify how the data will be used for each decision. For example, simple detections > 10 ppb at GIN-4 or TAN-56, would trigger modifications to the monitoring plan. A formal hypothesis test, as suggested in the comment, would be appropriate for the final decision to declare MNA non-functional in Zone 3 due to plume expansion beyond the 30% point.
14	Page 6-1 Section 6, Bullet 2, Item 3	Please clarify the intent of the phrase "particle intrusion". It is assumed the intent is to refer to the well 'silting up' or more specifically, to sediments accumulating inside the well screen, well bore, or well casing.	The text will be clarified as suggested.

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15	Ibid.	Please consider inclusion of a category for inspections that deals with micro-current development in the well or pump components. IDEQ believes this phenomenon was discovered as the probable cause for a component failure in a well at TAN in the last couple of year.	MW-2 did have this problem and we have included a corrective action to address the issue as part of the well maintenance program. The corrective action is to replace galvanized pipe with stainless steel. Measuring currents on a regular basis is not cost effective. Our approach is to develop pump systems that are designed to minimize or eliminate the effect. What we need to achieve is a system that will not fail due to corrosion between pump replacements. We are currently evaluating several pump systems for long term deployment (Barcad and RediFlo). These will be implemented as best management practice if the data support it.
16	Page 7-1 Section 7, Last Paragraph	The last sentence implies that all wellheads will have locking doors. All wellheads will have a locking device but not all wells have or will have a structure with a door that can be locked. Please clarify this paragraph.	Agree. Wording will be revised accordingly.
17	Appendix A, Table A-1	This appendix should be expanded to include information on other wells that are included in the SAP, Appendix B, but are not currently included in this appendix. These additional wells are TAN-25, -28, -29, 30A, -37A, and –37B.	These wells are in the appendix – see page A-3.
18	Page A-1 Ibid.	Please include a description for the discharge line material for well TAN-16.	The table will be revised to indicate current information.
19	Page A-3 Ibid.	Please include the diameter of the pump discharge line for well ANP-8 and a description of the discharge line material for wells TAN-25 and TSF-05B.	The ANP-8 production pump has been removed and we are currently testing two pumps in this well. We will discuss this at the meeting and will modify the table to reflect the test.
20	Page A-4 Ibid.	Please include the discharge line diameter and material type for wells TAN-57 and -58. It is assumed these wells will be sampled using a portable pump rig, if sampled according to Table 5-1 (page 5-2). Please state this information even if it relates to the use of portable equipment.	A decision has yet to be made on what pump system will be used in these wells. The table will reflect this.

Project Name:		Document Owner: Joe Rothermel	Phone Number:	Reviewer's Name/Discipline: IDEQ
Comments resolved by:		E-Mail Address:		Phone Number:
Doc ID: **DOE/ID-11066**		Document Title: **MNA OM&M Plan**		Rev. No.: **Rev. B**
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1	Page 5-8 Section 5.1.6	So much as the purge waters do not contain constituents at concentrations which need to be managed as hazardous waste, purging to the ground would be appropriate.		We agree and added "does not contain constituents that require management as hazardous wastes and …".

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
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Reply To
Attn Of: ECL-113

June 4, 2003

Ms. Katie Hain, Manager
Environmental Restoration Program
U.S. Department of Energy
Idaho Operations Office
850 Energy Drive
Idaho Falls, Idaho 83402

Subject: Review of Draft Final Monitored Natural Attenuation Remedial Action Work Plan and Draft Monitored Natural Attenuation Operations, Monitoring and Maintenance Plan for Test Area North, Operable Unit (OU) 1-07B.

Dear Ms. Hain:

We received the Draft Final Monitored Natural Attenuation Remedial Action Work Plan and Draft Monitored Natural Attenuation Operations, Monitoring and Maintenance Plan for Test Area North, Operable Unit (OU) 1-07B on May 16, 2003. Our comments on the draft documents were adequately addressed and we have no additional comments on the draft final.

Please contact me at (206) 553-7261, if you require clarification or elaboration on our position in this matter.

Sincerely,

Wayne Pierre
Project Manager

cc: Mark Jeffers, IDHW

Mark Shaw, DOE-Id